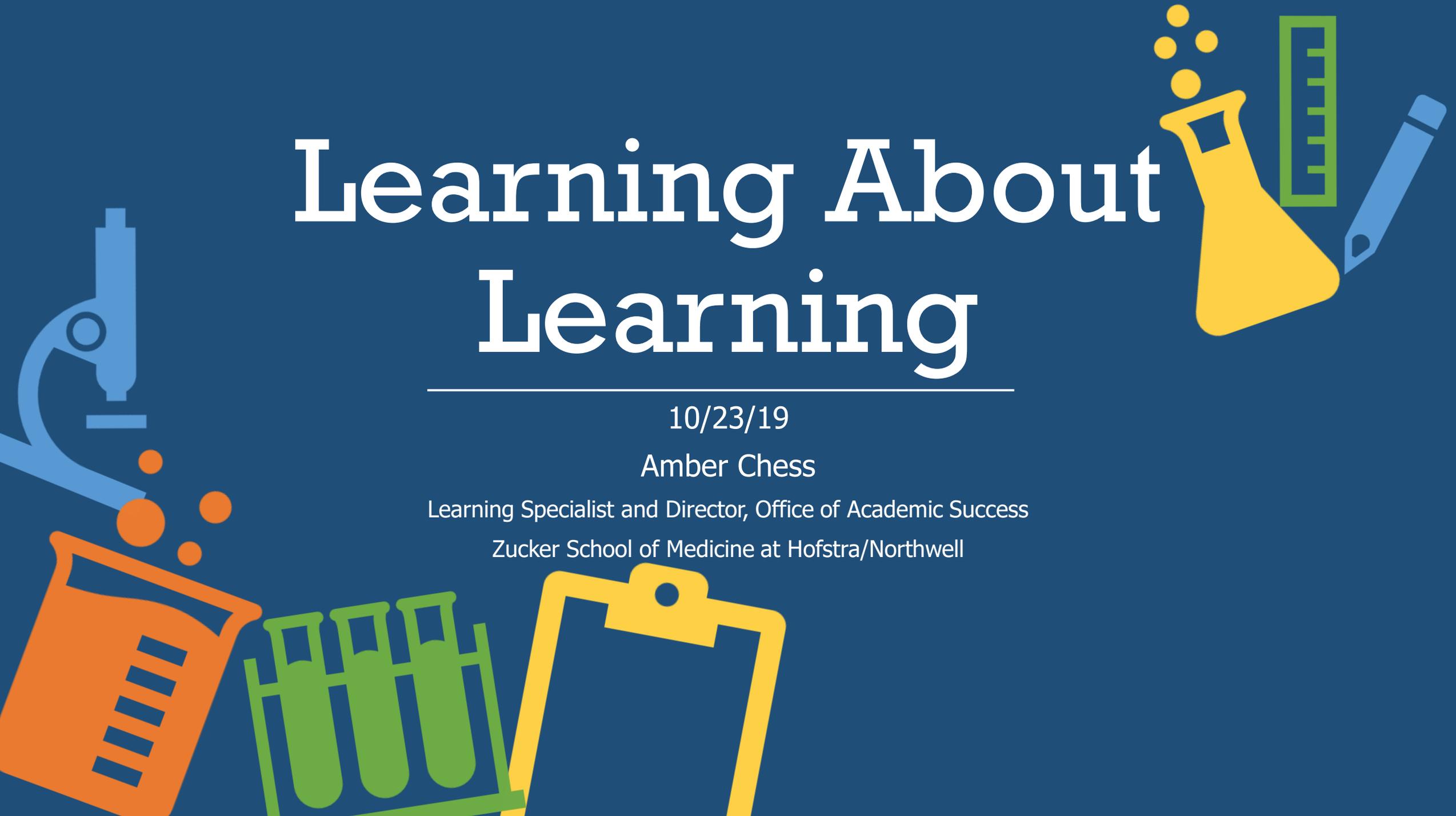


Learning About Learning



10/23/19

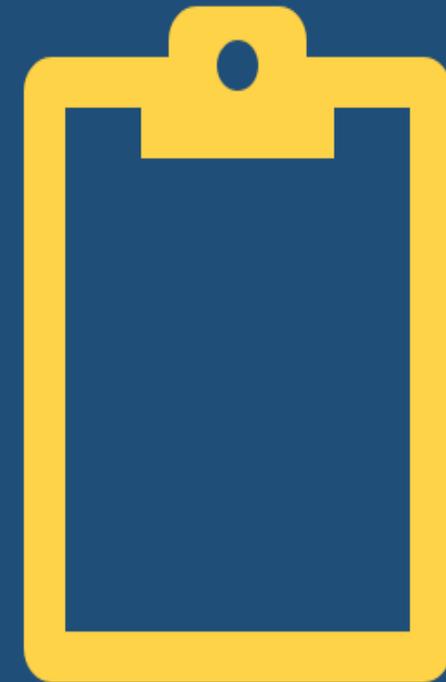
Amber Chess

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1. True or false: When it comes to learning, metacognition (e.g., thinking about thinking) can be just as important as intelligence.
2. What is the best way to learn from some text?
 1. Read and re-read the text
 2. Explain key ideas to yourself while reading
 3. Underline key concepts
 4. Be sure to use a highlighter
3. True or false: Intelligence is fixed at birth.
4. You have a test coming up. What's the best way to review the material?
 1. Circle key points in the textbook
 2. Review relevant points of lecture in audio format
 3. Take an informal quiz based on the material
5. To which of the following should you *not* tailor your learning?
 1. Learning styles (auditory, visual, etc.)
 2. Previous knowledge
 3. Interests
 4. Ability
6. True or false: Learning should be spaced out over time.

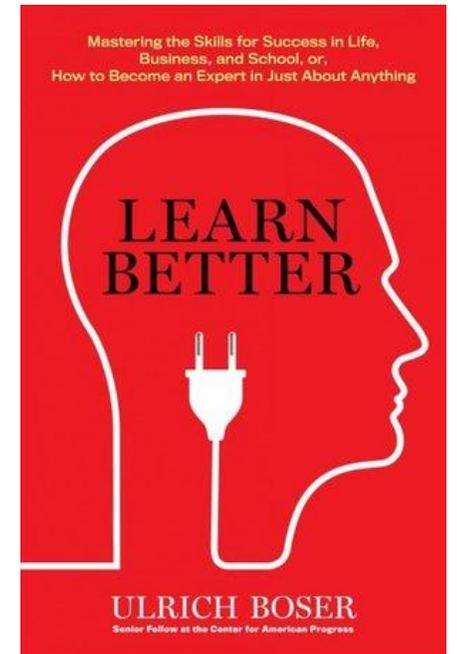


How well do you think you understand what good learning looks like?

- Ulrich Boser (a researcher, educator, and author) surveyed a sample of more than 3,000 Americans to test their beliefs about common learning myths. He found that the public is largely ignorant of research on learning.
- 75% of Americans rated themselves as “above average” in their ability to judge effective learning strategies.
- He calls it the, 'Been there, done that' problem. People went to school, so they have a feeling they know what works. Often they are WRONG!
- Have extra time and want to know more?

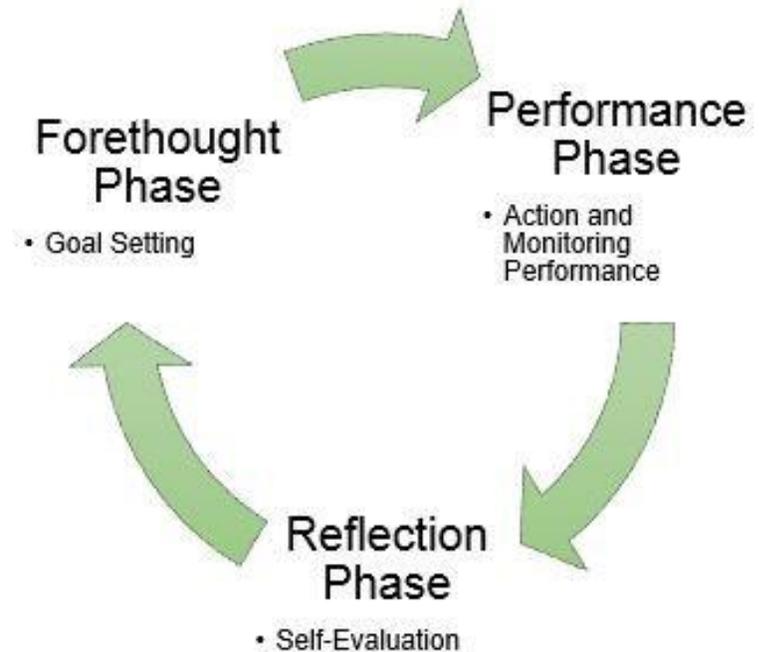
Listen to Boser’s interview on the metalearn podcast where he discusses how to become an expert at anything.

<http://www.metalearn.net/podcasts/ml72-ulrich-boser>



1. **True** or false: When it comes to learning, metacognition (e.g., thinking about thinking) can be just as important as intelligence.

- One's ability to encode, process, store, and retrieve information is important.
- Metacognitive skills are needed to become a self-regulated learner.
- Thinking about how you are learning by setting goals, making a plan, monitoring yourself, and then reflecting to see how to improve for next time is a key component in academic success.



Based on Zimmerman's concept of SRL from 2000.

2. What is the best way to learn from some text?

Read and re-read the text

Explain key ideas to yourself while reading

Underline key concepts

Be sure to use a highlighter

- Nearly 90% of respondents to Boser's survey thought that simply re-reading material is "highly effective" for learning. It is not.
- Highlighting and underlining also aren't so effective! "On the basis of the available evidence, we rate highlighting and underlining as having low utility. In most situations that have been examined and with most participants, highlighting does little to boost performance... it may actually hurt performance on higher-level tasks that require inference making." (Dunlosky & Rawson et al, 2013)
- Restating the text (in your own words is best) keeps you engaged and forces you to process what you are reading. You are much more likely to remember readings by doing this.

LEARN TO STUDY USING...
Elaboration
EXPLAIN AND DESCRIBE IDEAS WITH MANY DETAILS

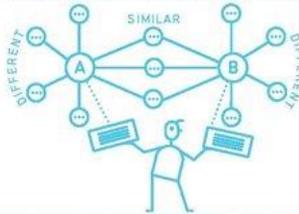
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HOW TO DO IT

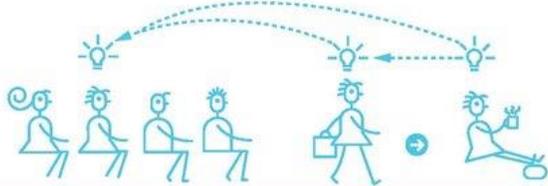
Ask yourself questions while you are studying about how things work and why, and then find the answers in your class materials and discuss them with your classmates.



As you elaborate, make connections between different ideas to explain how they work together. Take two ideas and think of ways they are similar and different.



Describe how the ideas you are studying apply to your own experiences or memories. As you go through your day, make connections to the ideas you are learning in class.



HOLD ON!

Make sure the way you are explaining and describing an idea is accurate. Don't overextend the elaborations, and always check your class materials or ask your teacher.



Work your way up so that you can describe and explain without looking at your class materials.



RESEARCH

Read more about elaboration as a study strategy

McDaniel, M. A., & Donnelly, C. M. (1996). Learning with analogy and elaborative interrogation. *Journal of Educational Psychology, 88*, 508-519.

Wong, B. Y. L. (1985). Self-questioning instructional research: A review. *Review of Educational Research, 55*, 227-268.

Content by Yana Weinstein (University of Massachusetts Lowell) & Megan Smith (Rhode Island College) | Illustrations by Oliver Caviglioli (teachingow2s.com/cogsci)
Funding provided by the APS Fund for Teaching and Public Understanding of Psychological Science



Elaboration



RESEARCH

Read more about elaboration as a study strategy

- Use elaborative interrogation

<http://www.learningscientists.org/blog/2016/7/7-1>

- Elaboration and Active Learning

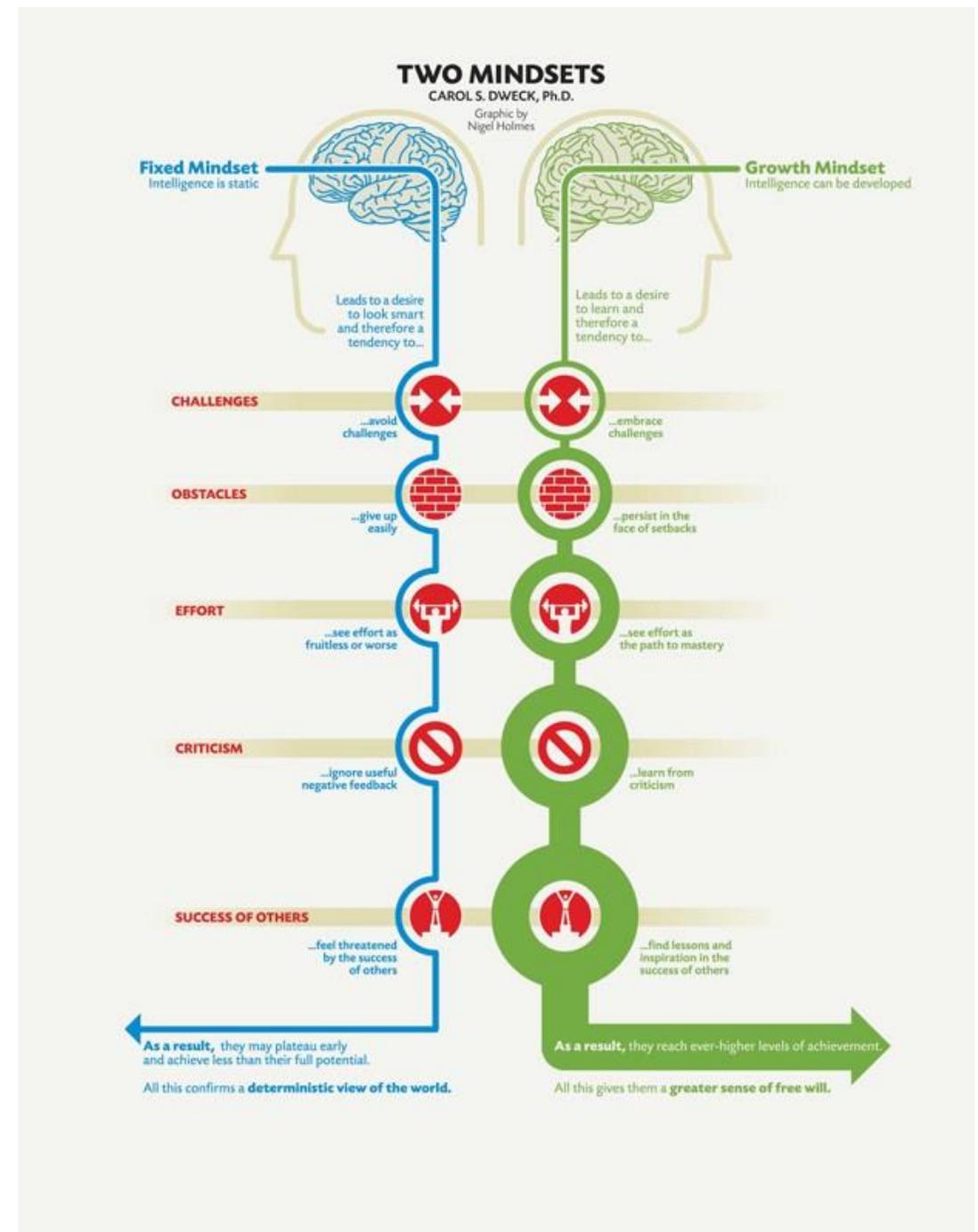
<http://www.learningscientists.org/blog/2016/9/8-1>

- McDaniel, M. A., & Donnelly, C. M. (1996). Learning with analogy and elaborative interrogation. *Journal of Educational Psychology, 88*, 508-519.

- Wong, B. Y. L. (1985). Self-questioning instructional research: A review. *Review of Educational Research, 55*, 227-268.

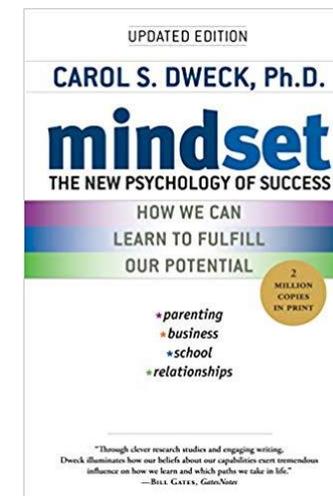
3. True or false: Intelligence is fixed at birth.

- More than 25% of respondents to Boser's survey believed intelligence is "fixed at birth".
- 71% of respondents indicated that teachers should motivate students by praising them "for being smart." This kind of praise is countereffective. **Praising effort, rather than ability, is far more likely to motivate students to work hard and improve.**
- The brain much more malleable than it was previously thought to be!
- Carol Dweck (Stanford) research on growth mindset.
- When students believe they can get smarter, they understand that effort makes them stronger. Therefore they put in extra time and effort, and that leads to higher achievement.



Additional information on Growth Mindset

- Just like a weightlifter you must exercise and practice to make your brain grow stronger.
- The power of “yet”. (I can’t do that... yet. I don’t know that... yet. I haven’t passed that exam... yet.)
- https://www.ted.com/talks/carol_dweck_the_power_of_believing_that_you_can_improve?language=en



4. You have a test coming up. What's the best way to review the material?

Circle key points in the textbook

Review relevant points of lecture in audio format

Take an informal quiz based on the material

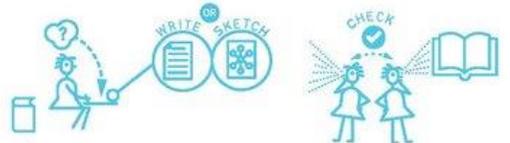
- 60% of respondents thought quizzes are not an effective way to gain new skills and knowledge.
- The opposite is true! Quizzing yourself on something you've just learned is a great example of active learning.
- Quizzes are a form of “active learning” that promotes better recall.
- Anki

LEARN TO STUDY USING...
Retrieval Practice
PRACTICE BRINGING INFORMATION TO MIND

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HOW TO DO IT

Put away your class materials, and write or sketch everything you know. Be as thorough as possible. Then, check your class materials for accuracy and important points you missed.



Take as many practice tests as you can get your hands on. If you don't have ready-made tests, try making your own and trading with a friend who has done the same.



You can also make flashcards. Just make sure you practice recalling the information on them, and go beyond definitions by thinking of links between ideas.



HOLD ON!

Retrieval practice works best when you go back to check your class materials for accuracy afterward.

Retrieval is hard! If you're struggling, identify the things you've missed from your class materials, and work your way up to recalling it on your own with the class materials closed.

Don't only recall words and definitions. Make sure to recall main ideas, how things are related or different from one another, and new examples.

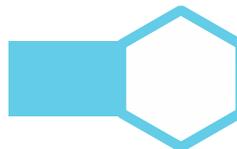
RESEARCH

Read more about retrieval practice as a study strategy

Roediger, H. L., Putnam, A. L., & Smith, M. A. (2011). Ten benefits of testing and their applications to educational practice. In J. Mestre & B. Ross (Eds.), *Psychology of learning and motivation: Cognition in education*, (pp. 1-36). Oxford: Elsevier.



Retrieval Practice



RESEARCH

Read more about retrieval practice as a study strategy

- Learning how to Learn: Practicing Retrieval
<http://www.learningscientists.org/blog/2016/6/23-1>
- Concept Map: What Does Retrieval Practice Do?
<http://www.learningscientists.org/blog/2016/4/1-1>
- How to Study with Flashcards
<http://www.learningscientists.org/blog/2016/2/20-1>
- Roediger, H. L., Putnam, A. L., & Smith, M. A. (2011). Ten benefits of testing and their applications to educational practice. In J. Mestre & B. Ross (Eds.), *Psychology of learning and motivation: Cognition in Education* (pp. 1-36). Oxford: Elsevier.

5. To which of the following should you not tailor your learning?

Learning styles

Previous knowledge

Interests

Ability

- Almost 90% of Boser's respondents thought that students should receive information in their own "learning style."
- One major recent review of research, among many others, stated that the authors "found virtually no evidence" for the idea.
- Your perceived learning style is probably just a preference.
- A better idea is to incorporate *many* learning "styles" into your studies. Try Dual Coding.

LEARN TO STUDY USING...
Dual Coding
COMBINE WORDS AND VISUALS

LEARNINGSOCIETISTS.ORG

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HOW TO DO IT

Look at your class materials and find visuals. Look over the visuals and compare to the words.

Look at visuals, and explain in your own words what they mean.

Take information that you are trying to learn, and draw visuals to go along with it.

HOLD ON!

Try to come up with different ways to represent the information visually, for example an infographic, a timeline, a cartoon strip, or a diagram of parts that work together.

INFOGRAPHIC

CARTOON STRIP

DIAGRAM

TIMELINE

GRAPHIC ORGANIZER

Work your way up to drawing what you know from memory.

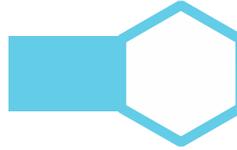
RESEARCH

Read more about dual coding as a study strategy

Mayer, R. E., & Anderson, R. B. [1992]. The instructive animation: Helping students build connections between words and pictures in multimedia learning. *Journal of Educational Psychology*, 4, 444-452.



Dual Coding



RESEARCH

Read more about dual coding as a study strategy

- Use dual coding

<http://www.learningscientists.org/blog/2016/9/1-1>

- Use dual coding

<http://www.learningscientists.org/blog/2016/5/12-1>

- Mayer, R. E., & Anderson, R. B. (1992). The instructive animation: Helping students build connections between words and pictures in multimedia learning. *Journal of Educational Psychology*, 4, 444-452.

6. True or false: Learning should be spaced out over time.

- Many students believe cramming works. Unfortunately, in medical school it does not.
- Cramming for exams is only a short-term solution. The content crammed is stored in the short-term memory where it is accessible only in the short-term. However, this does not create the needed lasting neural connections to the material. Cramming also does not help you develop deep understanding. Content is not learned beyond the surface level and often forgotten within days.
- Findings suggest that when you are learning new information, to retain that information long term, you should try reviewing it several times over an extended period. This is referred to as spaced repetition and there is a plethora of research backing it.
- Seeing the same concept numerous times, spaced over a period rather than all at once, will aid in your ability to remember it.
- Much research supports the idea that “spaced repetition” helps you retain knowledge over the long term.

LEARN TO STUDY USING... Spaced Practice
SPACE OUT YOUR STUDYING OVER TIME

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HOW TO DO IT

Start planning early for exams, and set aside a little bit of time every day. Five hours spread out over two weeks is better than the same five hours all at once.

Review information from each class, but not immediately after class.

After you review information from the most recent class, make sure to go back and study important older information to keep it fresh.

HOLD ON!

When you sit down to study, make sure you are using effective study strategies rather than just re-reading your class notes.

This may seem difficult and you may forget some information from day to day, but this is actually a good thing! This forces you to retrieve information from memory (see Retrieval Practice poster).

Create small spaces (a few days) and do a little bit over time, so that it adds up!

RESEARCH

Read more about spaced practice as a study strategy

Benjamin, A. S., & Tullis, J. (2010). What makes distributed practice effective? *Cognitive Psychology*, 61, 228-247.



Spaced Practice



RESEARCH

Read more about spacing as a study strategy

● Spacing your study

<http://www.learningscientists.org/blog/2016/7/21-1>

● Spacing in teaching practice.

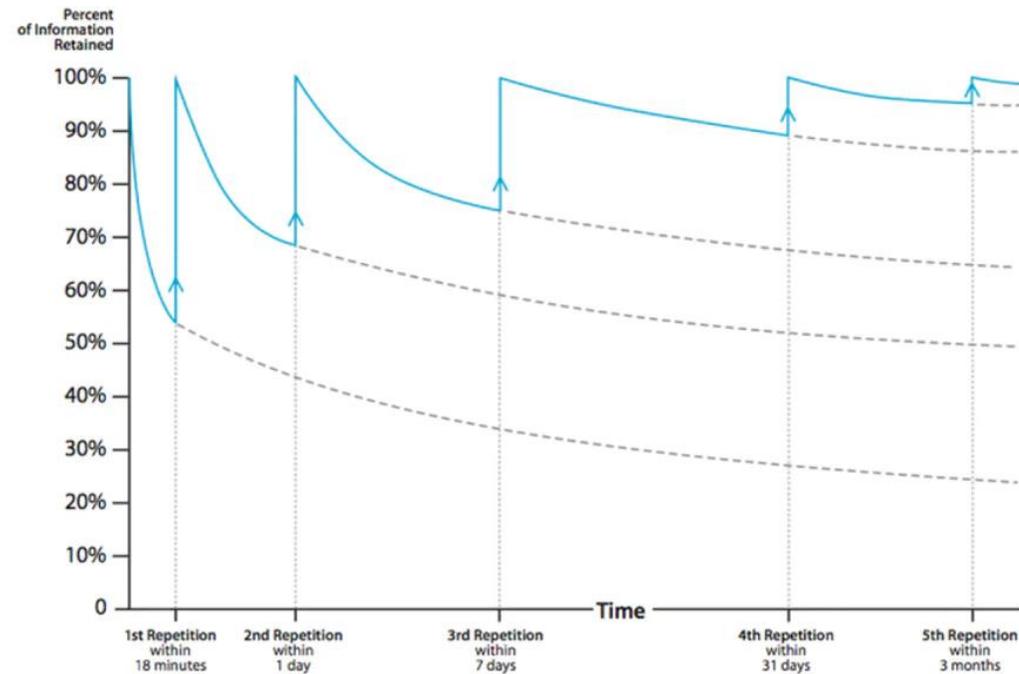
<http://www.learningscientists.org/blog/2016/4/12-1>

● Benjamin, A. S., & Tullis, J. (2010) What makes distributed practice effective? *Cognitive Psychology*, 61, 228-247.

Spaced repetition and the curve of forgetting

- <https://www.youtube.com/watch?v=cVf38y07cfk>

Rate of Forgetting with Study/Repetition



Questions and discussion

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References

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